

**GUIDELINES FOR THE PREPARATION OF
TRAFFIC IMPACT REPORTS
AND
TRAFFIC MANAGEMENT PLANS**

**CITY OF NASHUA, NH
BOARD OF PUBLIC WORKS
MAY 2000**

TABLE OF CONTENTS

	<u>PAGE</u>
<u>DESCRIPTION</u>	
 SECTION I-TRAFFIC IMPACT REPORTS	
A. ABSTRACT.....	1
B. WARRANTS FOR THE PREPARATION OF A TRAFFIC IMPACT REPORT.....	2
C. EXTENT OF STUDY AREA.....	2
D. REQUIRED REPORT CONTENT.....	3
1. PROJECT INTRODUCTION / GENERAL INFORMATION.....	3
2. EXISTING BASELINE CONDITIONS.....	3
3. TRIP GENERATION.....	5
4. TRIP DISTRIBUTION.....	5
5. EXISTING CONDITIONS UNDER THE BUILD SCENARIO.....	6
6. FUTURE BASELINE CONDITIONS.....	6
7. FUTURE CONDITIONS UNDER THE BUILD SCENARIO.....	7
8. MITIGATION MEASURES.....	7
9. APPENDIX CONTENT.....	8
E. ASSOCIATED DESIGN STANDARDS.....	9
 SECTION II- TRAFFIC MANAGEMENT PLANS	
A. ABSTRACT.....	10
B. WARRANTS FOR THE PREPARATION OF TRAFFIC MANAGEMENT PLANS.....	10
C. REQUIRED CONTENT OF TRAFFIC MANAGEMENT PLANS.....	10
D. ASSOCIATED DESIGN STANDARDS.....	12
 APPENDIX A-Traffic Impact Report Threshold Worksheet	
APPENDIX B- Applicability and Authority	

SECTION I - TRAFFIC IMPACT REPORTS

A. ABSTRACT

These guidelines are established to provide the basic information to be included in Traffic Impact Reports submitted to the City of Nashua. It is intended that Traffic Impact Reports be submitted as part of a developer's prospectus, or for other purposes. Specific projects may warrant that additional information or studies also be included.

Although the primary purpose of a Traffic Impact Report is to analyze the capacity of an impacted roadway network, the possibility may exist for other factors to be considered. These include:

- Safety
- Circulation patterns
- Traffic control needs
- Transit needs or impacts
- Transportation demand management
- Neighborhood impacts
- On-site and off-site parking adequacy
- Pedestrian and bicycle movements
- Service and delivery vehicle access
- Driveway location and operation
- Air quality and noise impact

In addition to the requirements defined in these Guidelines, it is recommended that the applicant familiarize himself/herself with the procedures defined in the most recent publication of Traffic Access and Impact Studies for Site Development, issued by the Institute of Transportation Engineers (ITE). The ITE publication provides additional information on the requirements relating to a Traffic Impact Report. The ITE publication is considered supplementary to these guidelines and may necessitate additional requirements.

Paper copies of the report shall be letter size 8 1/2"x 11". Report pages shall be numbered. Every page of each appendix shall be numbered. A table of contents shall be provided which includes major headings and contents of each appendix. Labeled separators should be used for each appendix.

The Applicant shall submit the required number of copies of the printed report to the Nashua Traffic Engineer for intra-City distribution. The Traffic Impact Report shall be delivered at least three weeks prior to any scheduled review meeting. It shall be the responsibility of the Applicant to contact the Nashua Traffic Engineer for the correct number of copies.

B. WARRANTS FOR THE PREPARATION OF A TRAFFIC IMPACT REPORT

A Traffic Impact Report shall be conducted under the following conditions:

- A proposed development will generate 75 or more trip ends per hour during the 7:00 to 9:00 AM or 4:00 to 7:00 PM Monday through Friday commuter peak periods.
- A proposed development will generate 100 or more trips ends per hour during any 24 hour period, 7 days a week.
- A proposed development will generate 1,200 or more trip ends in any 24 hour period, 7 days a week
- Any proposed permanent roadway closure.
- Any temporary roadway closure over 14 days in duration
- Under certain circumstances and at the discretion of the City Traffic Engineer, a development may warrant a Traffic Impact Report although proposed generated traffic is less than as listed above.

A Traffic Impact Report Threshold Worksheet is included in Appendix A. This worksheet shall be completed by the Applicant for submittal to the City Traffic Engineer prior to any work proceeding on the Traffic Impact Report.

C. EXTENT OF STUDY AREA

The extent of the study area for the Traffic Impact Report will depend on the location and size of the proposed development and the conditions prevailing in the surrounding roadway network. Larger developments proposed in congested or poorly accessible areas obviously require more extensive traffic analysis. Smaller sites may only require a minimal analysis of traffic on site and at immediately adjacent intersections.

In virtually all instances, intersections control the capacity of roadway networks. At a minimum: all Traffic Impact Reports shall include at least all site access points and major signalized and unsignalized intersections adjacent to the site. Sound engineering judgment should be made relative to including other adjacent intersections and intersections beyond this area. A general rule of thumb is to carry the analysis out at least as far as those areas where newly generated traffic will create an impact that is noticeable to most drivers.

Usually this occurs when newly generated site traffic represents at least 5 percent of a roadway's peak hour approach capacity. The study area boundaries may also be influenced by impacts other than pure capacity relationships. Other factors that may influence the study area include: safety, noise, sensitive receptors, etc. Care should be taken to include in the study all known congested locations that may be impacted by the proposed development. In instances where the Applicant is unsure as to the extent of the study area, it is recommended that the City Traffic Engineer be contacted to establish a site study area prior to implementing the Traffic Impact Report.

D. REQUIRED REPORT CONTENT

1. PROJECT INTRODUCTION / GENERAL INFORMATION

A description of the proposed project should be presented here. This description should include the type of project proposed, the geographic location of the project, size of the project, surrounding land uses and any other pertinent general aspects of the development. A locus map should be provided that shows the site in a regional context, and in relation to the existing transportation facilities.

2. EXISTING BASELINE CONDITIONS

At this time, the project limits should be defined and discussed, and the appropriate transportation network shown. A general discussion of the affected transportation facilities is required. This discussion should include the types of facilities affected, the general condition of these facilities, and their relative importance to the roadway network.

Existing traffic data must be collected at various important segments of the roadway network. This typically involves obtaining peak period turning movement counts (TMCs). The TMCs should normally be conducted Tuesday, Wednesday, or Thursday between 7:00 to 9:00 AM and then again from 3:00 to 7:00 PM. These times encompass the traditional commuter peak hours. Some developments and/or adjacent roadway networks may necessitate the gathering of traffic data at times other than the traditional commuter peak periods. Saturday and/or Sunday TMCs may be required in areas of heavy retail use. Additionally some developments may warrant 24-hour traffic counts, origin-destination studies, or the gathering of other transportation related information.

The TMCs should conform to the requirements of the most recent edition of the Manual of Transportation Engineering Studies, published by ITE. The TMCs should also contain vehicular classifications, as a minimum these classifications should include the following:

- Passenger Cars (including motorcycles, pickups, vans, small step vans)
- Single -axle Trucks (Single unit trucks)
- Multi-axle Trucks
- Buses
- School Buses

The TMCs shall then be used to produce existing condition traffic flow maps. The traffic flow maps should be developed covering the entire study area, and shall show peak hour periods. The traffic flow maps can also be used to show the ADT volumes.

In general, if seasonal or other factors are used to adjust counted traffic volumes, then only those factors that increase baseline volumes shall be used. Factors applied to traffic volumes that would result in a decrease will not typically be accepted.

There may be exceptions to this however. For example, if a traffic count is done in close proximity to a major retail center during the holiday shopping period, then an adjustment may be permitted to the baseline traffic volumes. Any factors to adjust down traffic volumes shall be well documented.

Capacity and level of service (LOS) analyses shall be performed for the key locations within the roadway network for the existing conditions. These analyses should be performed using the most recent edition of the Highway Capacity Manual (HCM), Special Report 209, published by the Transportation Research Board. Computer software supporting the HCM can be used for these analyses. The software shall be of a type commonly used by the transportation industry or as approved by the City Traffic Engineer.

Accident history shall be reviewed at the key locations within the study area, and at locations where engineering judgment dictates. A written request for accident data should be made to the Nashua Police Department. The accident data requested should include the necessary information so as to determine if a safety hazard exists at a given location.

Consideration should also be given to the impact that the proposed development will have on pedestrians. The applicant shall take into account the amount of pedestrian activity and the type of pedestrians that may be impacted. If a school should be located within the study area, the development's impact to school related pedestrians shall be addressed.

3. TRIP GENERATION

Proposed vehicular trip generation should follow the procedures as defined in Traffic Access and Impact Studies for Site Development and should be based on rates found in the latest edition of Trip Generation published by ITE. The unadjusted ITE rates must be used for the particular land use code. Typically the rates used for AM and PM peak hour of adjacent street traffic should be used. These rates should be presented in this section of the report. The latest edition of Trip Generation, should be used for all land use codes.

If employment levels are known, trip rates per employee should also be cited. If ITE rates are not available or the sample size is prohibitively small; other transferable empirical research may be cited, fully justified and the sources shown.

These generated traffic volumes shall then be added to the existing traffic volumes as described in the next section.

4. TRIP DISTRIBUTION

Trip distribution should typically follow the guidelines as established in Traffic Access and Impact Studies for Site Development. Sound engineering judgment should be used to distribute the proposed vehicle trips onto the adjacent roadways. All generated vehicle trips to/from the site through all access points are to be documented.

Generated trips to and from the proposed development shall typically be distributed based on: the existing directional split of adjacent traffic, the type of proposed development and the area from which it will attract traffic, and the surrounding land uses, and population bases. Other factors may also influence trip distribution. The Applicant may wish to contact the City Traffic Engineer for further guidance on trip distribution if any uncertainties exist.

In instances where the Applicant wishes to use pass-by trips, analytic bases for reducing the adjacent street volumes due to pass-by trips, impulse trips, etc., are to be documented in detail. The distinction shall be made between primary trips and pass-by trips. A primary trip is defined as a trip with the purpose of traveling to and leaving directly from the site. A pass-by trip is defined as a trip that is taken directly from the traffic stream passing the facility on the adjacent street system and does not require a diversion from another roadway.

All developments should also consider other study area sites relating to trips generated from nearby approved or committed projects, including state and/or local approvals. Such nearby projects may be across the City line.

5. EXISTING CONDITIONS UNDER THE BUILD SCENARIO

The impacts of the proposed development on the surrounding area are now addressed. Typically in the Traffic Impact Report, this will involve LOS calculations at the key locations previously described. These LOS calculations shall assess the impact of generated vehicles on the existing roadway network. In some cases other impacts such as safety, noise, etc. also need to be discussed in this section.

Major projects must often be developed in phases in areas where the existing infrastructure may be limited and in need of extensive improvements. Many major projects necessitate improvements to the area's roadway infrastructure, both internally and externally.

The nature of these improvements and their timing can be related to the phasing of the development, as well as the changes within the area as a whole.

The applicant shall also investigate if the proposed site generated traffic may warrant the installation of a traffic signal at an existing unsignalized intersection. The signal warrant analysis shall be performed using the most recent edition of the Manual on Uniform Traffic Control Devices.

6. FUTURE BASELINE CONDITIONS

The Applicant shall prepare an analysis of the development's traffic during future conditions. In order to do this the Applicant must generate future baseline traffic conditions without the project. This will typically be done using a growth rate that is compounded annually. The Applicant may wish to adjust the traffic volumes to future conditions using another method. If another method is used, the basis for such shall be documented.

Traffic growth rates may vary from location to location within the City. The Applicant may use a growth rate based on his / her prior experience with traffic volumes in the City. Justification of all growth rates must be presented. If the Applicant is unfamiliar with the City's traffic history, consultation with the City's Traffic Engineer is recommended.

Future conditions should normally cover a five- year time horizon. A five year time horizon will typically provide an acceptable view of the future operational aspects of the transportation system with the proposed development, and will provide an understanding of what improvements may be needed.

Depending on the type of development proposed there may be conditions when other horizon dates should be analyzed. A two-year time horizon may be accepted as a minimum for low impact developments. Larger developments may warrant study based on either a ten-year horizon, or on both 5 and 10 year horizons. Beyond a ten-year horizon, too many variables can change, with these changes precluding the development of detailed or accurate traffic forecasts. Traffic Access and Impact Studies for Site Development should also be consulted to aid in determining an appropriate time horizon.

The Applicant shall also make effort to identify all known proposed projects within the study area. These other proposed projects shall be reviewed to determine if they need to be incorporated into the future baseline traffic conditions.

7. FUTURE CONDITIONS UNDER THE BUILD SCENARIO

The impacts of the proposed development on the surrounding area during future conditions shall be addressed in this section. The analysis of future conditions under the build scenario provides an assessment of how the roadway network will operate in the study horizon year with the site being developed as proposed. Degradation in intersection LOS conditions and other roadway operating parameters shall be discussed.

8. MITIGATION MEASURES

As discussed in Subsections 1-7 under Required Report Content, 4 separate scenarios shall be analyzed. These scenarios are:

1. Existing Conditions
2. Existing Conditions under the Build Scenario
3. Future Conditions
4. Future Conditions Under the Build Scenario

Under the above sections, the Applicant shall perform analyses of the roadway network's ability to accommodate the traffic volumes. The Applicant shall identify all impacts that the proposed development will have on the adjacent roadway network. Mitigation measures to alleviate safety or capacity deficiencies caused by the proposed development shall be addressed under this section.

Regarding intersection capacity, the goal of attaining a LOS of D or better is recommended for all hours of day including the AM and PM commuter peak hours. Should site related traffic degrade the LOS below D, then mitigation measures are recommended. Improvements in access, geometry, or operations must be investigated.

When reasonable improvements cannot sufficiently accommodate projected traffic, more detailed assessments of project size, land use, or development phasing may be required. It is important to assess a range of alternatives to provide viable, efficient, and economical options that the City might find acceptable. As individual improvements are made, the interrelationship of all the improvements, both on-site and off-site, must be monitored and assessed to ensure that the improvements function as expected.

The report should identify the responsible party for the implementation of any proposed improvements. The approximate cost and mechanism by which these commitments will be executed and their intended duration should be indicated. A schedule of when, in relation to any project phasing, particular improvements need to be implemented should be outlined.

9. APPENDIX CONTENT

The following list identifies data which should be included in the Appendix of each report.

A. Recorded traffic counts-tabular summaries

- Turning movement counts.
- Directional volume counts.
- Existing AM/PM peak period and 24 hour traffic volumes.
- Calculated Peak Hour Factors by individual approach.
- Future year peak hour traffic volumes.
- Adjustment factors and sources.

B. Capacity and LOS analysis data

- Lane geometry
- Assumed signal phasing
- Critical volumes
- Assumed saturation flow rates
- All work sheets or computer outputs

C. ITE land use code sheets

D. Plotted stopping sight distance analyses

E. Signal warrant analyses sheets (where applicable)

- F. Arterial analysis sheets (where applicable)
- G. Weaving analyses (where applicable)
- H. Queue Analysis (where applicable)
- I. Construction and layout plans as required

E. ASSOCIATED DESIGN STANDARDS

In addition to the requirements set forth in these guidelines, the Applicant shall be aware of and may be required to use the latest edition of the following publications. In case of conflict, the more stringent requirement shall generally apply.

1. Traffic Access and Impact Studies for Site Development, Institute of Transportation Engineers (ITE)
2. Trip Generation, ITE
3. Manual of Transportation Engineering Studies, ITE
4. Highway Capacity Manual, Special Report 209, Transportation Research Board
5. A Policy on Geometric Design of Highways and Streets, American Association of State Highway and Transportation Officials
6. Manual on Uniform Traffic Control Devices, U.S. Dept. of Transportation, Federal Highway Administration
7. Standard Specifications For Road Construction, Nashua Board of Public Works
8. Standard Specifications For Sidewalk Construction, Nashua Board of Public Works
9. Highway Design Manual, New Hampshire Dept. of Transportation
10. Standard Specifications for Road and Bridge Construction, New Hampshire Dept. of Transportation
11. Zoning and Subdivision Ordinances, City of Nashua

SECTION II-TRAFFIC MANAGEMENT PLANS

A. ABSTRACT

Traffic management in construction and maintenance work zones is important to the safety of both workers and motorists. It is the purpose of these guidelines to; establish warrants for Traffic Control Plans (TCP), to standardize the materials and equipment used in a TCP, and to standardize the placement of these materials and equipment..

B. WARRANTS FOR THE PREPARATION OF TRAFFIC MANAGEMENT PLANS

During any time the normal function of a roadway is suspended, temporary traffic control planning must provide for continuity of function (movement of traffic, pedestrians, and access to property/utilities).

Traffic control plans shall be prepared by the Applicant under the following conditions:

- Roadway closure
- Lane closure
- Any detouring of traffic
- Any construction work within the roadway right-of-way including travel lane, paved shoulder, graded shoulder, sidewalk, foreslope, and backslope.

Conditions other than those listed above may impact the regular flow of traffic and warrant a TCP. It is recommended that the City Traffic Engineer be contacted to determine if a TCP is needed.

C. REQUIRED CONTENT OF TRAFFIC MANAGEMENT PLANS

In general, the TCP shall conform to the requirements of standard accepted transportation engineering practices. The Applicant shall familiarize himself with the guidelines set forth in the most recent edition of Part VI of the Manual on Uniform Traffic Control Devices (MUTCD), titled Standard and Guides for Traffic Controls for Street and Highway Construction, Maintenance, Utility, and Incident Management Operations. These guidelines shall be used as a base to formulate the TCP. Additional reference guides are listed in Subsection D.

All traffic control devices used on the City's streets for highway construction, maintenance, utility, or any other temporary traffic control operations shall conform to the applicable specifications to the MUTCD; and Sections 618 and 619 of the Standard Specifications For Road and Bridge Construction issued by the New Hampshire Department of

Transportation. It is recommended that for construction jobs with estimated bid costs over \$500,000.00 or complex jobs requiring multiple construction phases that the below traffic control devices be listed separately in the bid proposal:

<u>Pay Item</u>	<u>Unit</u>
Construction Signing	SF
Traffic Cones	EA
Reflectorized Drum	DD
Reflectorized Drum with Flasher	DD
Temporary Fence	LF
Temporary Precast Median Barrier	LF
Portable Type III Barricade	EA
Temporary Lane Markings	LF
Construction Signing Removed and Reset	EA
Maintenance and Movement of Temporary Control Devices	LS
Portable Changeable Message Sign	UNIT

The Applicant shall try to avoid lane closures during peak commuter periods. Commuter peak hour periods generally occur from 7:00 AM to 9:00 AM and then again from 4:00 PM to 6:00 PM, Monday through Friday. Should lane closures be necessary during these peak times, an effort shall be made to limit the lane closure to the off-peak direction of travel.

The TCP shall include provisions that allow for the continued use of pedestrian facilities, and for unrestricted vehicular access to abutting properties. In the event that work will restrict pedestrian movement, the closure shall be implemented using the proper signing, cones, barricades, barrels, temporary fence, or other approved device. If the work will restrict vehicular access to abutting property, there shall be provisions such that the Contractor coordinate the work with the respective property owner.

The Applicant shall be required to submit the TCP to the office of the Traffic Engineer according to the schedule below.

<u>Design Stage</u>	<u>Plans</u>
10% - 30%	1
40% - 70%	1
80% - PS&E	1

The TCP shall show the locations of all of the traffic equipment to be used on the project. A scale plan showing the construction site and placement of the equipment at the site shall be submitted. Generally, this scale shall be at 1 inch equals 20 feet. Additional TCPs showing roadway signing are often required at a larger scale.

The size of the TCPs submitted to the Traffic Engineer shall generally be 36 inches by 22 inches, and shall bear a legend identifying all traffic control equipment to be used. For smaller projects, 8 ½ by 11 inch sheets may be submitted.

The TCP shall be subject to approval of the City Traffic Engineer prior to any field installation.

D. ASSOCIATED DESIGN STANDARDS

In addition to the requirements set forth in these guidelines, the Applicant shall be aware of and may be required to use the latest edition of the following publications. In case of conflict, the more stringent requirements shall generally apply.

1. Standards and Guides for Traffic Controls for Street and Highway Construction, Maintenance, Utility, and Incident Management Operations, Part VI of the Manual on Uniform Traffic Control Devices
2. Standard Specifications for Road and Bridge Construction, New Hampshire Department of Transportation
3. State of New Hampshire Flagger Handbook

APPENDIX A

TRAFFIC IMPACT REPORT THRESHHOLD

WORKSHEET

CITY OF NASHUA, NH

FILE NO. _____

Traffic Impact Report (TIR) Threshold Worksheet

Complete this form to determine if your project requires a Traffic Impact Report, as per City Code, Section

Project Name: _____

Type of Development: _____

Applicant: _____ Owner Agent

Location: _____

Address: _____ Phone Number: _____

Roadway(s) Where Site Access Drives Shall Be Located: _____

RESIDENTIAL DEVELOPMENT

Anticipated Land Use	Acreage to be Developed	Number of Units

CBD

NON-CBD

Development Peak Hour and Maximum Number of Generated Trips:

Trip Rate Source

ITE Code: _____

Other: _____

NON-RESIDENTIAL DEVELOPMENT

Anticipated Land Use	Project Size (Acres, Employees, GFA, Unit, Other)

CBD

Non-CBD

Development Peak Hour and Maximum Number of Generated Trips:

Trip Rate Source

ITE Code: Other:

PLEASE COMPLETE THE TABLE BELOW:

CONDITION	HOUR	ANTICIPATED GENERATED TRAFFIC (TRIP ENDS)	TIR THRESHOLD (TRIP ENDS)	TIR REQUIRED
ADJACENT ROADWAY PEAK HOUR			75/HOURS	
DEVELOPMENT PEAK HOUR			100/HOURS	
24-HOUR PERIOD	N.A.		1,200/24 HOURS	
PERMANENT ROADWAY CLOSURE	N.A.	N.A.	N.A.	YES
TEMPORARY ROADWAY CLOSURE GREATER THAN 14 DAYS	N.A.	N.A.	N.A.	YES
OTHER CONDITIONS			N.A.	

APPENDIX B

APPLICABILITY AND AUTHORITY

GUIDELINES FOR THE PREPARATION OF

TRAFFIC IMPACT REPORTS

AND

TRAFFIC MANAGEMENT PLANS

**WERE OFFICIALLY ADOPTED BY THE NASHUA
BOARD OF PUBLIC WORKS ON APRIL 4, 2000**